



<NOTICE>

<PREAMB>

ENVIRONMENTAL PROTECTION AGENCY

[EPA–HQ–OAR–2012-0636; FRL–9725-7]

Notice of Opportunity To Comment on a Methodology for Allocating Greenhouse Gas Emissions to a Combined Heat and Power Configuration Under the Renewable Fuels Program, and the Application of this Methodology to a Proposed Plant by Dakota Spirit AgEnergy in Spiritwood, North Dakota

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: EPA is evaluating a petition by Dakota Spirit AgEnergy for approval of a fuel pathway for its corn ethanol plant under the Renewable Fuels Standard (RFS) program. The corn ethanol plant would import process steam from a combined heat and power (CHP) system located at an offsite facility. EPA is inviting comment on the application of a certain methodology for allocating greenhouse gas (GHG) emissions for the steam and on the feasibility and appropriateness of using this allocation methodology for other similar CHP configurations under the RFS program.

DATES: Comments must be received on or before October 11, 2012.

ADDRESSES: Submit your comments, identified by Docket ID No. **EPA–HQ–OAR–2012-0636**, by one of the following methods:

- www.regulations.gov: Follow the on-line instructions for submitting comments.
- Email: a-and-r-docket@epa.gov, Attention Air and Radiation Docket ID EPA-HQ-OAR-2011-0542
- Mail: Air and Radiation Docket, Docket No. EPA-HQ-OAR-2012-0636, Environmental Protection Agency, Mailcode: 6406J, 1200 Pennsylvania Ave., NW., Washington, DC 20460
- Hand Delivery: EPA Docket Center, EPA/DC, EPA West, Room 3334, 1301 Constitution Ave., NW., Washington, DC, 20460, Attention Air and Radiation Docket, ID No. EPA-HQ-OAR-2011-0542. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

Instructions: Direct your comments to Docket ID No. EPA-HQ-OAR-2012-0636. EPA's policy is that all comments received will be included in the public docket without change and may be made available online at www.regulations.gov, including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through www.regulations.gov or e-mail. The www.regulations.gov website is an "anonymous access" system, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to EPA without going through www.regulations.gov your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you

submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD-ROM you submit. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses. For additional information about EPA's public docket visit the EPA Docket Center homepage at <http://www.epa.gov/epahome/dockets.htm>.

Docket: All documents in the docket are listed in the www.regulations.gov index. Although listed in the index, some information is not publicly available, e.g., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in www.regulations.gov or in hard copy at the Air and Radiation Docket and Information Center, EPA/DC, EPA West, Room 3334, 1301 Constitution Ave., NW, Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the Air Docket is (202) 566-1742).

FOR FURTHER INFORMATION CONTACT: Venu Ghanta, Office of Transportation and Air Quality (MC6401A), Environmental Protection Agency, 1200 Pennsylvania Ave., N.W., Washington, DC 20460; telephone number: (202) 564-1374; fax number: (202) 564-1686; email address: ghanta.venu@epa.gov.

SUPPLEMENTARY INFORMATION:

<HD1>Introduction

As part of changes to the Renewable Fuel Standard (RFS) program adopted in a rule published on March 26, 2010¹, EPA specified the types of renewable fuels eligible to participate in the RFS program through approved fuel pathways. Table 1 to 40 CFR 80.1426(f) of the RFS regulations lists three critical components of an approved fuel pathway: (1) Fuel type; (2) feedstock; and (3) production process. Each specific combination of the three components, or fuel pathway, is assigned a renewable fuel category for use of the fuel in the RFS program. EPA may also independently approve additional fuel pathways not currently listed in Table 1 for participation in the RFS program, or a third party may petition for EPA to evaluate a new fuel pathway in accordance with § 80.1416.

Pursuant to 40 CFR 80.1416, EPA received a petition from Dakota Spirit AgEnergy (“Dakota”) on October 15, 2011, requesting that EPA evaluate a new fuel pathway’s lifecycle GHG reduction and provide a determination of the renewable fuel category for which the new pathway may be eligible. Dakota is proposing to build a dry-mill corn ethanol plant in Spiritwood, North Dakota, with a nameplate production capacity of 65 million gallons of ethanol per year. Dakota’s proposed process is unlike those used in pathways modeled for the 2010 RFS rule in that they plan to meet their process steam needs by importing steam from the adjacent Spiritwood Station coal-fired power plant, which would operate in a combined heat and power (CHP) mode.

¹ 75 FR 14670.

EPA has not previously considered the treatment of steam from an offsite CHP plant in a lifecycle emissions accounting analysis under the RFS program. EPA is not aware of a previous regulatory context where an allocation approach has been applied to determine the emissions associated with process steam from an offsite facility. This notice describes the methodology EPA is considering to allocate emissions to the imported steam Dakota plans to use for biofuels production, as well as the Agency's rationale for selecting this methodology in the context of the RFS program and for the type of configuration being considered. EPA invites comment on the application of the GHG allocation methodology and on the feasibility and appropriateness of using this allocation methodology for other similar CHP configurations under the RFS program.

<HD1>Background on CHP

CHP is an efficient, clean, and reliable approach to generating power and thermal energy from a single fuel source. By installing a CHP system designed to meet the thermal and electrical base loads of a facility, CHP can greatly increase the facility's operational efficiency and decrease energy costs. CHP systems offer considerable environmental benefits when compared with purchased electricity and onsite-generated heat. By capturing and utilizing heat that would otherwise be wasted from the production of electricity, CHP systems require less fuel than equivalent separate heat and power systems to produce the same amount of energy.

In the 2010 RFS rule, EPA evaluated a corn ethanol biorefinery that utilized an onsite CHP system as part of the ethanol production process. The process evaluated a CHP system installed at the biorefinery which generated process steam and electricity for use in the process for

producing ethanol. Dakota's proposed approach is different in that they plan to import process steam from the adjacent Spiritwood Station power plant that will operate in CHP mode.

The Spiritwood power plant combusts coal in a circulating fluidized-bed boiler that will generate steam at high temperature and pressure. This high pressure steam will be sent through a high-pressure steam turbine (HPST), where energy will be extracted to produce electricity. The steam will exit the HPST at lower pressure and temperature, at which point some of the steam will be diverted to the Dakota biorefinery plant to provide thermal energy for the ethanol production process. The remaining steam at Spiritwood will be sent through a low-pressure steam turbine (LPST) to produce additional electricity. The extraction steam diverted for use at the ethanol plant will result in a decrease in the amount of power to be generated from the power plant. Therefore, although the amount of electricity generated is reduced, the total fuel consumed and the resulting GHG emissions of the power plant remain unchanged.

To determine the emissions associated with the extracted steam, the total emissions of the Spiritwood power plant need to be allocated to the power plant's power production and to the steam extracted for use at the biorefinery. EPA analyzed the Dakota CHP configuration and reviewed several different allocation methods, including the GHG Protocol². EPA's review indicated that currently there is no one recommended allocation method for allocating emissions to the energy outputs (electrical and thermal) from a CHP system. EPA's review also indicated that the most appropriate allocation methodology for a CHP system will be dependent on the type of CHP configuration in use, as well as the primary use of the system's electrical and

² Jointly convened by the World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI), Allocation of emissions from a Combined Heat and Power Plant, September 2006.

thermal outputs. Based on the plant configuration presented in the Dakota petition, EPA is considering using the “work potential” allocation approach to allocate emissions.

<HD1>Work Potential Allocation Approach

EPA considers the work potential allocation approach to be most appropriate for CHP systems that use heat to primarily produce mechanical work or power, such as the case at the Spiritwood plant where the primary use for the steam is for power generation.³ The work potential approach allocates emissions based on the useful energy⁴ represented by electric power and heat. For the configuration presented in the Dakota petition, the method allocates emissions to the extracted steam based on the amount of electricity that the steam would have produced had the steam not been diverted for use at the biorefinery.

The Spiritwood power plant is designed for the primary function of generating electricity. The total emissions at the Spiritwood plant are constant, whether steam is diverted or not. When steam is diverted to the Dakota biorefinery, the emissions associated with the diverted steam and the resulting loss in electricity production is evaluated via the work potential method. We can determine an emission factor for the power plant when it is just generating electricity and not diverting steam to the Dakota biorefinery (i.e., operating in a “power only” mode). The GHG emissions attributed to the extracted steam is determined by estimating the amount of power not generated by the power plant because the steam was diverted from the turbine, and applying the power plant’s “power only” emissions factor to that value. The emission factor is unchanged since the total emissions at the Spiritwood plant are unchanged and only a small portion of the

³ The GHG Protocol recommends the use of this approach if the thermal output of the CHP system is to be used for mechanical power

⁴ Useful energy is defined as the ability of heat to perform work.

steam energy generated at the power plant is diverted to the biorefinery. The process for determining the steam GHG emission factor using the work allocation approach is summarized by the following steps:

1. Calculate the GHG emission factor for the Spiritwood power plant without any steam extracted;
2. Determine the amount of electricity that is not generated due to the extraction of steam for the Dakota plant; and
3. Apply the Spiritwood emissions factor to the amount of electricity not generated due to steam extraction and calculate the associated emissions.

This following example illustrates how the work potential method allocates emissions based on useful energy produced. In Dakota's petition, they presented an example where the Spiritwood plant generates 92 MW of electric power in power-only mode, but only produces 82 MW of electric power in CHP mode due to the steam extraction. Thus, the steam extraction displaces about 11% of the total power production. Using the work potential allocation method, the extracted steam is allocated 11% of the total emissions from the Spiritwood plant, whereas the remaining 89% of emissions are allocated to electricity production.

<HD1>Other Allocation Approaches

EPA reviewed other allocation approaches to assess their appropriateness for allocating emissions for the Dakota petition. The other two most common methods to allocate emissions from a CHP system are:

Efficiency Allocation Method – The efficiency method allocates GHG emissions based on the amount of fuel used to produce each final energy stream. Emissions are allocated based on the efficiencies of thermal energy and electricity production, and the emission allocation will vary based on how the electrical and thermal efficiencies are defined. The actual efficiencies of heat and power production are often not clearly defined for CHP systems, and assumed default values are typically used.

Conversion or Energy Content Method – This method allocates emissions based on the relative amounts of power and thermal energy output. It makes no allowance for the relative value of the outputs or the relative efficiencies of generation and simply allocates emissions based on the relative energy content of each output.

The efficiency and energy content allocation approaches are based on assumptions, either of the efficiencies with which steam and electricity are generated, or on the relative values of energy outputs. As an example, the emission allocation of the efficiency method will vary based on how the electrical and thermal efficiencies are defined. Under these approaches, the emissions allocated to the remaining electricity generation (in terms of lbs/MWh) at the Spiritwood plant in CHP mode would be lower than the original emissions factor for electricity generated by Spiritwood operating in power-only mode, indicating an over-allocation of emissions to the extraction steam.

Since CHP system design and operating characteristics vary so widely, leading organizations in this field have not developed a consensus on one preferred allocation method. The California

Air Resources Board issued a technical document as part of its Climate Change Reporting Requirements⁵ that reviewed several allocation methods but did not recommend any one allocation method in particular. The Climate Registry (TCR)⁶, the former EPA Climate Leaders program, and the GHG Protocol⁷ recommend the efficiency method, and that CHP facilities identify actual thermal energy and electricity production efficiencies. In the absence of actual emissions, default efficiencies of 35% for electricity (grid generation efficiency) and 80% for steam (stand alone boiler efficiency) are suggested. Neither the default nor calculated efficiencies appear representative of the Spiritwood operations. However, as stated above, the GHG Protocol⁸ also recommends the use of the work potential method if the thermal output of the CHP system is going to be used for mechanical power.

The Western Climate Initiative received various recommendations on the treatment of combined heat and power in its initial draft design guidance for recording greenhouse gas ("GHG") emissions since it has implications in both the industrial and electricity sectors. The recommendations varied based on the type of CHP configuration. WCI in its final 2008 recommendation⁹ did not advance one allocation method over another, stating "adequate quantification methods will be established for emissions sources prior to including them in the program". The British Standards Institute (BSI)'s Publicly Available Specification (PAS) 2050¹⁰

⁵ Cogeneration: Proposed Approach for Mandatory Greenhouse Gas Emissions Reporting. California Air Resources Board: Climate Change Reporting, Handout for ARB's GHG Technical Team Discussions, June 2007.

⁶ General Reporting Protocol, Version 1.1, The Climate Registry, May 2008.

⁷ Jointly convened by the World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI), Allocation of Emissions from a Combined Heat and Power Plant, September 2006.

⁸ Jointly convened by the World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI), Allocation of emissions from a Combined Heat and Power Plant, September 2006.

⁹ The WCI Partner jurisdictions recognize the importance of combined heat and power (cogeneration) in the program scope and are continuing to evaluate its implications for the program design. Western Climate Initiative, Design Recommendations for the WCI Regional Cap-and-Trade Program. September 23, 2008, Corrected March 13, 2009.

¹⁰ British Standards Institute (BSI), PAS 2050: 2011, Specification for the assessment of the life cycle greenhouse gas emissions of goods and services, Section 8.5, Emissions from energy production using CHP.

recommends using an approach based on the unit of useful energy delivered. The specification recommends “the allocation shall be carried out in proportion to the amount of useful energy delivered in each form, multiplied by the intensity of GHG emissions associated with each unit of useful energy delivered as heat and electricity.” This methodology acknowledges that each CHP system may have a different ratio of outputs of thermal and electrical energy.

<HD1>Application of the Work Potential Allocation Methodology to the Dakota Plant

Under the RFS2 program, EPA is considering use of the work potential method for the configuration outlined in the Dakota petition because the primary purpose of the steam generated at Spiritwood power plant before extraction is to produce power. This method allocates the emissions to extracted steam based on the amount of power displaced (i.e., the electricity not generated).

A Memorandum to the Docket explains in more detail how the work potential methodology would be applied to the plant configuration proposed for the Dakota plant, resulting in a specific GHG emission factor per mmbtu of steam energy. This emissions factor would be used in analyzing the total GHG emissions per mmbtu of ethanol produced by the Dakota facility, as part of determining whether the ethanol produced by the facility would qualify under the lifecycle GHG thresholds established in the RFS program. For the configuration outlined in the Dakota petition, EPA’s analysis finds that the process steam has an emission factor of 53,175 grams CO₂-eq/mmbtu steam.

EPA invites comments on the proposed application of the work potential methodology to determine emissions associated with imported steam to the Dakota plant in the context of lifecycle emissions accounting. Furthermore, EPA invites comment on applying the work potential approach to other plants with similar CHP configurations under the RFS program. EPA also requests information on the appropriateness of applying alternative allocation approaches outlined in this notice to the Dakota plant, as well as any other approaches that could also be used to allocate emissions to steam for this specific CHP configuration under the RFS program.

Dated: August 31, 2012.

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